1.0 Executive Summary

The Project

The Michigan Department of Transportation (MDOT) proposes a project to reconstruct 6.7 miles of I-94 in the City of Detroit. The project begins just east of the I-94/I-96 interchange, includes the I-94/M-10 and I-94/I-75 system interchanges and ends just east of the I-94/Conner Avenue interchange. The project scope includes: the construction of an additional lane in each direction along I-94 (total of four through lanes in each direction); the reconstruction of the two system interchanges; reconstruction of various partial and full-service interchanges; the removal and/or replacement of a number of pedestrian, railroad and vehicle bridges; and the construction of continuous service drives along the corridor and through the interchanges.

VE Meeting Synopsis

A VE study of the I-94 rehabilitation near the end of the Early Preliminary Engineering (EPE) phase was conducted during a three-week period, with two week-long meetings in Detroit separated by one intermediate week. The following firms, along with representatives from MDOT, participated in the VE study: Alfred Benesch & Company, HNTB Michigan, Bloom Consultants, Parsons Brinckerhoff Michigan, Inc., and URS Corporation. A brief synopsis of the events of each week is listed below.

Week 1 (2/29/04–3/5/04)

Week 1 took place at the Detroit meeting site. MDOT presented the project to the VE team, including a van tour of the project site and the nearby Davison (M-8) and I-696 freeways. The VE team, using a structured VE methodology and the information presented to them by MDOT, studied the project and began constructing a cost model. The VE team conceived 91 ideas, presented them to MDOT at a Thursday checkpoint presentation, and reduced the ideas to be studied to five validation studies and 12 design proposals.

Week 2 (3/8/04–3/12/04)

At their individual offices, the VE team members carried out the validation studies and developed the design proposals and cost model.

Week 3 (3/15/04–3/18/04)

Back at the Detroit meeting site, the VE team continued the validation studies and further refined the design proposals and the cost model. On Thursday, the team concluded its study and presented its findings to MDOT.

VE Scope

The scope of the VE team's assignment was twofold: to conduct a value engineering study and to validate several elements of the draft EPE documents developed for the draft environmental impact statement (DEIS). The value engineering study included developing design alternatives that would improve EPE features within the right-of-way (ROW) footprint. The validation portion of the study consisted of determining whether the project elements studied could feasibly be built as proposed in the DEIS. Specifically, the salient question to answer was "Is it feasible for the current design elements to be constructed within the DEIS right-of-way footprint shown on the exhibits developed by the Phase I EPE consultant?"

Validation of the DEIS Design

The VE team studied five major elements to validate the EPE design proposed in the DEIS. Each validation item and a summary of the VE team's findings are listed below. Note that the VE team was given the proposed "footprint" shown in the Recommended Alternative Report, August 2002.

1. Footprint for M-10/I-94 Interchange

The proposed M-10/I-94 interchange appears to be feasible within the DEIS footprint. The main curves for all of the system interchange ramps are at the minimum radius for 40 mph design speed. Several of the stacked-ramps as drawn in the DEIS will have grades greater than 5.5 percent, but are within the 6 percent maximum specified by AASHTO. During the development of preliminary geometrics, some of the grades may need to be increased to meet vertical clearance requirements and standard ramp gore design. Traffic operations might benefit from moving some gore locations.

2. Footprint for I-94/I-75 Interchange

The proposed I-94/I-75 interchange does **NOT** appear to be buildable within the DEIS footprint. One or more continuous service roads cannot be built without deficient vertical clearances and grades. Vertical clearances and grades are also a problem for the single-lane WB I-94 to NB I-75 and EB I-94 to SB I-75 exit ramps. The VE team suggests moving the WB I-94, NB I-75 and SB I-75 service roads and the WB-to-NB and SB-to-WB ramps outside of the EPE footprint. One additional vacant property acquisition in the NW quadrant will be required to complete this change.

3a. Dequindre Bridge Widening

Using the existing Dequindre bridge with the proposed I-94 reconstruction appears to be feasible within the DEIS footprint. The VE study identified that the DEIS Cost Estimate contains $14.2 million for unspecified work to this large bridge which was rebuilt in 1999. In lieu of the WB deck widening, it may be more economical in the long term if the deck(s) were fully replaced.

3b. Footprint for Service Roads at Dequindre Bridge, Including Grades Between Touch Downs and Over Active Railroad

The EB and WB service drives appear to be buildable within the DEIS footprint. The VE study identified that insufficient ROW information was available to assure that MDOT owns the land below the proposed structures. Furthermore, it is not clear that the proposed ROW acquisitions accurately represent what MDOT knows, based on previous ROW dealings in this industrial area.

Subsequent to the VE meetings, MDOT requested an eight-foot separation between the new service drive bridges and the existing Dequindre bridge deck, in order to accommodate bridge inspection equipment.

Approximately 17 ft. will separate the EB service drive and the Waste Management/Department of Public Works building (nine feet if the eight-foot separation discussed above is provided). Additionally, it appears both service drives as currently designed will have grades approaching six and nine percent, which will cause operational and maintenance problems if at-grade intersections with Russell and St. Aubin are provided, as shown on the EPE plans.

4. Corridor Drainage (Freeway and Service Road Collection, Storage, and Disposal)

The drainage appears to be feasible within the DEIS footprint. The VE study also concluded that a single 84" pipe in the I-94 mainline corridor might be more economical than the proposed twin 60" pipes. The proposed concept is to outlet I-94 drainage

into the city combined storm system, a continuation of the existing system. If the drainage west of Woodward Avenue was conveyed to a new retention chamber before being outletted into MDOT's existing I-96 tunnel sewer, which was built to convey I-96 storm water to the Detroit River, the separation of this segment from the city system would be feasible.

The cost estimate should be adjusted to account for the relocation of two Public Lighting Department substations at the I-94/M-10 and I-94/Gratiot interchanges.

5. *Construction Staging and Scheduling*
The scheduling and staging of the project appears to be feasible within the DEIS footprint.

The VE team suggests that the final environmental impact study (FEIS) preclude the use of restrictive wording related to detour options for I-94 traffic. Allowing the contractor access to the full I-94 mainline will reduce the construction and detour time, and it will provide a cost savings due to the temporary sheet piling required for part-width construction.

Three construction staging schemes were developed. Under each scheme, the estimated construction time is seven to nine years, with main sequential contracts of about $250–$275 million.

Recommended Design Alternatives

In addition to the validation studies, the VE team developed the following proposals with recommended design alternatives.

1. *Review total area and cost of retaining walls.*
The cost of retaining walls in the DEIS is $20.6 million. The VE team estimates that the maximum cost of retaining walls is $92.5 million and recommends that the cost estimate be revised accordingly.

2. *Use perimeter road system for the service drives at the M-10 and I-75 system interchanges.*
Replace the service drives within the M-10 and I-75 system interchanges with perimeter service drive systems and U-turn structures for a total cost savings of $22.4 million.

3. *Shift location of eastbound service drive to the north at Mt. Elliot.*
Shifting the eastbound service drive to the north reduces the possibility of impacts to the Packard Building.

4. *Eliminate traffic signals at certain intersections.*
Eliminating unnecessary traffic signals results in a cost savings of $1.2 million.

5. *Use 12-foot instead of 14-foot median shoulder for I-94 mainline.*
Using 12-foot median shoulder results in a cost savings of $2 million.

6. *Use four-foot-wide median barrier for I-94 mainline instead of the six foot shown.*
Using four-foot median barrier results in a cost savings of $1.8 million.

7. *Use valley gutter instead of concrete barrier at outside shoulders of I-94 mainline.*
Using valley gutter results in a cost savings of $8.4 million.

8. *Shift I-94 centerline to the north through the M-10 interchange.*
Shifting the I-94 centerline to the north through the M-10 interchange minimizes impacts to the WSU baseball field and eliminates a broken-back curve on I-94.

9. *Shorten all pedestrian bridges to touch down between the service drives and the mainline.*
Touching down the pedestrian bridges between the service drives and the mainline results in a cost savings of $4.1 million.

10. *Reconfigure E. Grand Blvd. with service drive near GM plant to reduce or eliminate need for ROW from GM.*
This proposal reduces the need to acquire ROW from GM saving $0.8 million; however, additional costs for roadway and walls would be required.

11. *Use 2'-4"-wide median barrier for I-94 mainline instead of the six foot shown, and widen barrier only at structures.*
Using 2'-4" median barrier results in a cost savings of $5.4 million.

12. *Reduce amount of construction on M-10 south of the interchange.*
This proposal reduces the project construction costs by $31.7 million.

Cost Model

The DEIS cost estimate has two major components: quantity-based costs and a series of contingencies calculated in terms of the percentage of the quantity-based cost. Each of the contingencies are cumulative. The DEIS estimate is $959 million in 2002 dollars.

The VE team developed a cost model based on the ASTM standard classifications for Allocated Sums in Construction. The VE team's cost of the project is divided into three successive levels: minimum cost, expected cost and maximum cost. Minimum cost includes: base cost– which is derived from assumed quantities and unit prices, and allowances–which are for items that we know will be required but which cannot be estimated at this early phase of the project. Applying this process the minimum cost for the I-94 project is $643 million in 2001 dollars.

In order to mitigate the impact of unplanned events and other risks, a series of contingencies were added to the project and included in the expected cost. These costs are not supposed to be incurred but at this early phase of the project are included because not enough is known about the existing condition. The sum of the contingencies is $132 million in 2001 dollars. Therefore, the expected cost of the I-94 project is $775 million in 2001 dollars.

Finally, because a series of programming decisions will be made during the future stages of planning and engineering, the resulting impacts to cost are accounted for as reserve costs. Again, these costs are not supposed to be incurred but they are provided to cover future changes in the client's program. The sum of the reserve is $204 million in 2001 dollars. Therefore, the maximum cost of the project, which includes the reserve costs is $979 million in 2001 dollars and $1.13 billion in 2004 dollars.

Conclusion

The VE team was charged with two tasks during the VE meetings: conduct a value engineering study and validate five elements of the current DEIS design and the cost estimates.

With the exception of the I-94/I-75 interchange, the VE team finds that the studied components of the project appear to be buildable within the footprint indicated on the EPE base map.